

### **Remarks**

Claims 1-25 and 32-33 are currently pending in the patent application. For the reasons and arguments set forth below, Applicant respectfully submits that the claimed invention is allowable over the cited references.

The non-final Office Action dated April 21, 2006 indicated that claims 1-21 are allowed, and listed the following rejections: claims 22, 25 and 32 are rejected under 35 U.S.C. § 102(e) over Mao *et al.* (U.S. Publication No. 2003/0039750 A1) or alternatively Serp *et al.* article; claims 23-24 and 33 are rejected under 35 U.S.C. §103(a) over Mao in view of Dai *et al.* (U.S. Publication No. 2001/0019238A1; *now* U.S. Patent No. 6,900,580) or in view of Serp; and claims 32-33 are rejected under 35 U.S.C. § 102(e) or 35 U.S.C. § 103(a) over Resasco *et al.* (U.S. Patent No. 6,413,487).

Applicant appreciates the allowance of claims 1-21.

Applicant respectfully traverses the Section 102(e) rejections of claims 22, 25 and 32 in view of the Mao reference because the Office Action fails to present a reference that corresponds to all of the claimed limitations. For example, regarding claim 22, the Office Action fails to cite any portion of the Mao reference that corresponds to the claimed limitations directed to forming hydroxyl material on the substrate. Instead of citing a reference that corresponds to these limitations (in the context of Section 102 or, of a Section 103 rejection where the Mao reference is modified as proposed), the Office Action merely asserts that alumina inherently has surface hydroxyl groups. However, the Office Action has failed to cite any portion of the Mao (or any other) reference that corresponds to the step of forming hydroxyl groups on the substrate.

Moreover, the alumina in the Mao reference cited by the Office Action does not correspond to a substrate as claimed. The alumina nanoparticles in the Mao reference are coated with a metal in an electroless plating bath (*see e.g.*, paragraphs 0019 and 0020). These coated alumina nanoparticles are then deposited onto a substrate (*see e.g.*, paragraph 0032). In this regard, the Mao reference does not correspond to the claimed limitation directed towards a substrate being immersed in an aqueous bath with an iron-containing material and a reducing agent which forms iron-containing nanoparticles on the substrate. Specifically, the Mao reference teaches forming the metal containing

nanoparticles and then depositing them on a substrate in separate steps (*see e.g.*, paragraphs 0029 and 0033). Accordingly, the Section 102(e) rejections of claims 22, 25 and 32 are improper and Applicant requests that they be withdrawn. Accordingly, the Section 102(e) rejection of claim 22 is improper and Applicant requests that it be withdrawn.

Applicant further traverses the Section 102 rejections over the Mao reference because the Office Action's assertions of inherency on page 2, in paragraph 1, suggesting, for example, that "alumina inherently has surface hydroxyl groups" are unsupported and improper. To establish inherency, the extrinsic evidence "must make clear that the missing descriptive matter *is necessarily present in the thing described in the reference*, and that it would be so recognized by persons of ordinary skill." *Continental Can Co. v. Monsanto Co.*, 948 F.2d 1264, 1268, 20 U.S.P.Q.2d 1746, 1749 (Fed. Cir. 1991) (emphasis added). "Inherency, however, may not be established by probabilities or possibilities. The mere fact that a certain thing may result from a given set of circumstances is not sufficient." *Id.* at 1269, 20 U.S.P.Q.2d at 1749 (quoting *In re Oelrich*, 666 F.2d 578, 581, 212 U.S.P.Q. 323, 326 (C.C.P.A. 1981)). In this instance, the Office Action fails to show that hydroxyl groups are formed in the Mao reference in a manner that corresponds to the claimed limitations. Moreover, Applicant submits that this assertion of inherency is improper because the asserted substrate (alumina) does not necessarily involve the formation of hydroxyl groups. For instance, the Serp article cited by the Office Action states that the hydroxyl groups can be removed by heating the alumina (*see e.g.*, page 3089). Therefore, alumina does not necessarily have surface hydroxyl groups, and certainly does not necessarily imply that the claimed limitations, including those directed to the formation of hydroxyl groups, are necessarily present.

Applicant further traverses the section 103(a) rejections of claims 23, 24 and 33 because the references cited by the Office Action do not teach or suggest all of the limitations found in the claimed invention. The rejections of dependent claims 23 and 24, which depend from claim 22, are improper because the Mao reference fails to teach or suggest the claimed limitations of claim 22 as discussed above with the Section 102(e) rejections; the addition of the Dai reference fails to overcome these deficiencies. The

rejection of independent claim 33 is also improper, as the claimed limitations are not taught or suggested by the Mao reference.

Applicant also traverses the Office Action's interpretation of product by process claim 33 and the corresponding rejection thereof. The dispositive issue in evaluating the propriety of such a claim is whether the claimed structure exhibits any unexpected properties compared with the structure disclosed by the prior art (see M.P.E.P. § 2113 and *Ex parte Gray*, 10 USPQ2d 1922 (Bd. Pat. App. & Inter. 1989)). The Background section of the claimed invention states that single-walled carbon nanotubes grown using relatively dirty catalytic sites (*e.g.*, with mound-like patterned alumina particles) can sometimes exhibit undesirable characteristics. Catalyst supported on powders, as in the Mao reference, can also be challenging to implement due to difficulties associated with controlling individual catalytic nanoparticle size and in the patterning of nanoparticles at smaller scales. The claimed invention exhibits cleaner catalytic sites, which are smaller and more uniform in size than those disclosed by the prior art. (*See e.g.*, Mao paragraph 0029). Accordingly, the Section 103(a) rejection of claim 33 is improper and Applicant requests that it be withdrawn.

Applicant further traverses the section 102(e) and 103(a) rejections of claims 32 and 33 based upon the Resasco ('487) reference. The Office Action's assertion that alumina inherently contains hydroxyl molecules is unsupported and improper for the reasons discussed above in connection with a similar inherency-type argument asserted in connection with rejections relying upon the Mao reference. Here, the cited portion of the Resasco reference is directed to depositing catalyst particles on a support material, which fails to describe limitations directed to hydroxyl molecules on a substrate. In addition, the Office Action's rejection of product by process claim 33 is improper for the reasons discussed above. Accordingly, Applicant requests that the Section 102(e) and 103(a) rejections of claims 32 and 33 be withdrawn.

Regarding the rejections which, in the alternative, rely upon the Serp *et al.* article, Applicant traverses the rejections and respectfully requests that this citation be removed from further consideration because the Examiner has failed to provide the Applicant with a copy of the reference as indicated in Image File Wrapper Final Rule dated July 20,

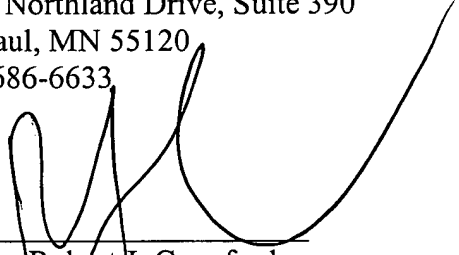
2003. Specifically, Applicant requested a copy of the Serp article on February 1, 2006, upon which certain ones of the prior standing rejections relied. Applicant has now received an incomplete copy of said article as denoted upon the Form PTO-892 and on the 1<sup>st</sup> page of said article. In this regard, any rejection based upon the Serp reference is improper and should be removed. Notwithstanding, Applicant has attempted to address the rejections above, based upon the Serp article, as best as possible relying on the incomplete copy of said article.

In view of the above discussion, Applicant believes that each of the rejections has been overcome and the application is in condition for allowance. A favorable response is requested. Should there be any remaining issues that could be readily addressed over the telephone, the Examiner is encouraged to contact the undersigned at (651) 686-6633.

Respectfully submitted,

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By:   
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